DISCOLORED WATER: CAUSES AND WHAT'S BEING DONE TO FIX IT

TOWN OF SCITUATE

Public Meeting August 13, 2018

TOPICS

Water quality

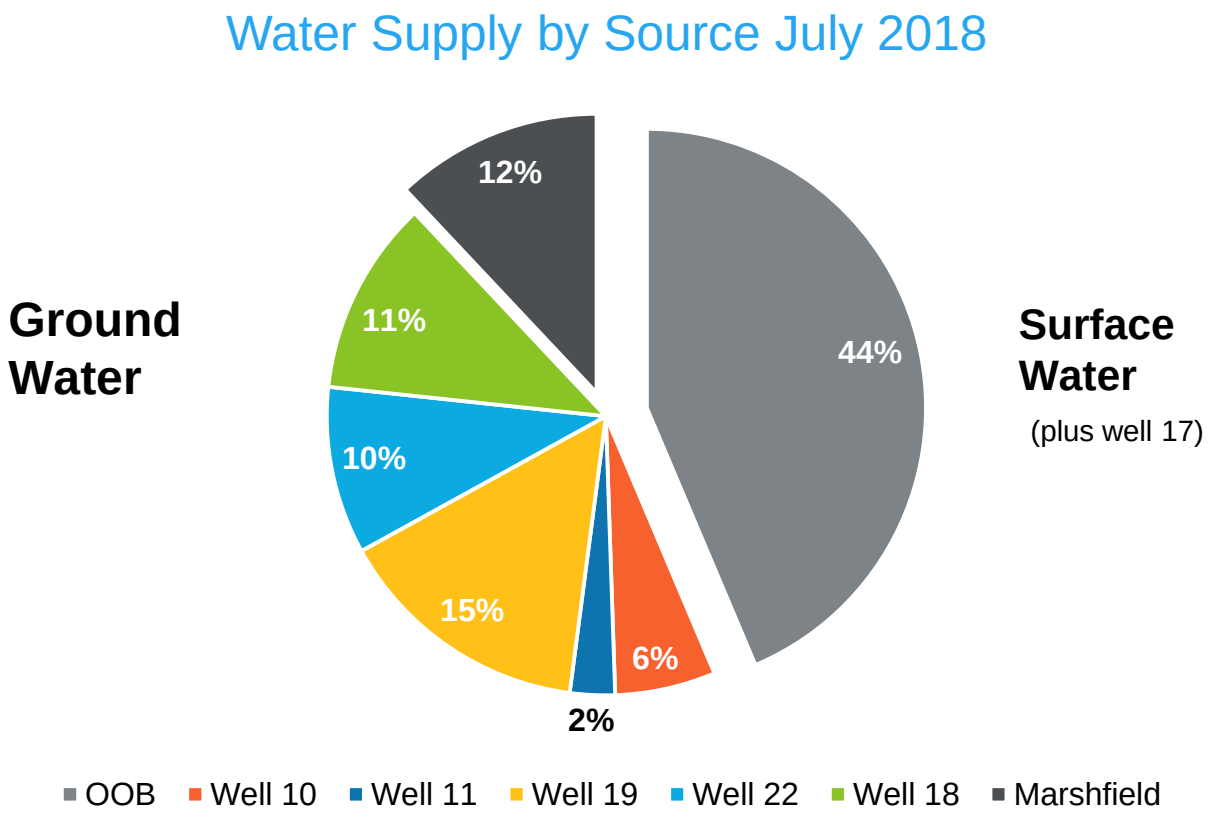
- Discolored water
  - Is it safe?
  - What is being done?
- Trihalomethanes
  - What are they?
  - Where do they come from?
  - Should we be concerned?
- Manganese
  - What is it?
  - Where does it come from?
  - Should we be concerned?

OVERVIEW

- Background
- Causes
- Concerns
- Actions
- Expectations

BACKGROUND

- **Where does our water come from?**



BACKGROUND

- Discolored water occurring in many Massachusetts towns
- Drinking water is heavily regulated and constantly monitored
- This has been a problem in Scituate for generations
- Over the last five years the Town has invested heavily in the system
- This is a priority for Scituate and the Town committed to developing and implementing long and short term improvements

BACKGROUND

DRINKING WATER IS HEAVILY REGULATED AND CONSTANTLY MONITORED

Regulations: Safe Drinking Water Act

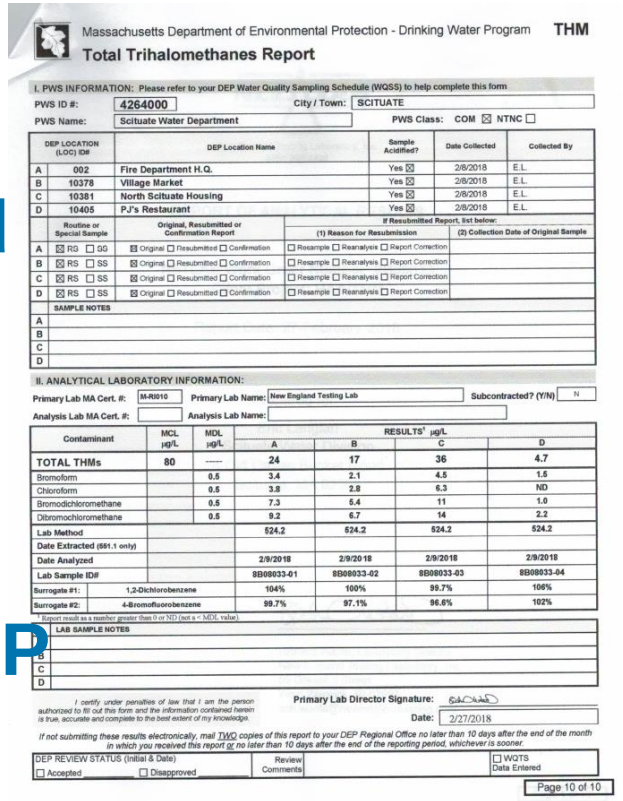
- **Regulations to protect drinking water in the United States**
- **Regulations are very conservative**
- **Regulations are continually reviewed and updated**

BACKGROUND

DRINKING WATER IS HEAVILY REGULATED AND CONSTANTLY MONITORED

Monitoring (sampling) program

- All samples analyzed by independent third party licensed laboratory.
- 3,500 samples taken in the last five years
- ALL Results submitted to MADEP
- DEP will increase monitoring frequency if they have concerns



Massachusetts Department of Environmental Protection - Drinking Water Program **THM**

Total Trihalomethanes Report

I. PWS INFORMATION: Please refer to your DEP Water Quality Sampling Schedule (WQSS) to help complete this form

PWS ID #: 4264000 City / Town: SCITUATE

PWS Name: Scituate Water Department PWS Class: COM ☒ NTNC ☐

	DEP LOCATION (LOC) ID#	DEP Location Name	Sample Acidified?	Date Collected	Collected By
A	002	Fire Department H.Q.	Yes ☒	2/8/2018	E.L.
B	10378	Village Market	Yes ☒	2/8/2018	E.L.
C	10381	North Scituate Housing	Yes ☒	2/8/2018	E.L.
D	10405	PJ's Restaurant	Yes ☒	2/8/2018	E.L.

	Routine or Special Sample	Original, Resubmitted or Confirmation Report	If Resubmitted Report, list below: (1) Reason for Resubmission	(2) Collection Date of Original Sample
A	☒ RG ☐ GG	☒ Original ☐ Resubmitted ☐ Confirmation	☐ Resample ☐ Reanalysis ☐ Report Correction	
B	☒ RS ☐ SS	☒ Original ☐ Resubmitted ☐ Confirmation	☐ Resample ☐ Reanalysis ☐ Report Correction	
C	☒ RS ☐ SS	☒ Original ☐ Resubmitted ☐ Confirmation	☐ Resample ☐ Reanalysis ☐ Report Correction	
D	☒ RS ☐ SS	☒ Original ☐ Resubmitted ☐ Confirmation	☐ Resample ☐ Reanalysis ☐ Report Correction	

SAMPLE NOTES

A

B

C

D

II. ANALYTICAL LABORATORY INFORMATION:

Primary Lab MA Cert. #: M-RI010 Primary Lab Name: New England Testing Lab Subcontracted? (Y/N) N

Analysis Lab MA Cert. #: Analysis Lab Name:

Contaminant	MCL µg/L	MDL µg/L	RESULTS[1] µg/L A	B	C	D
TOTAL THMs	80	-----	24	17	36	4.7
Bromoform		0.5	3.4	2.1	4.5	1.5
Chloroform		0.5	3.8	2.8	6.3	ND
Bromodichloromethane		0.5	7.3	5.4	11	1.0
Dibromochloromethane		0.5	9.2	6.7	14	2.2
Lab Method			524.2	524.2	524.2	524.2
Date Extracted (551.1 only)						
Date Analyzed			2/9/2018	2/9/2018	2/9/2018	2/9/2018
Lab Sample ID#			SB08033-01	SB08033-02	SB08033-03	SB08033-04
Surrogate #1: 1,2-Dichlorobenzene			104%	100%	99.7%	106%
Surrogate #2: 4-Bromofluorobenzene			99.7%	97.1%	96.6%	102%

[1] Report result as a number greater than 0 or ND (not a < MDL value)

LAB SAMPLE NOTES

A

B

C

D

I certify under penalties of law that I am the person authorized to fill out this form and the information contained herein is true, accurate and complete to the best extent of my knowledge.

Primary Lab Director Signature:

Date: 2/27/2018

If not submitting these results electronically, mail TWO copies of this report to your DEP Regional Office no later than 10 days after the end of the month in which you received this report or no later than 10 days after the end of the reporting period, whichever is sooner.

DEP REVIEW STATUS (Initial & Date) ☐ Accepted ☐ Disapproved Review Comments ☐ WQTS Data Entered

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CONCERNS
TRIHALOMETHANE

- **Regulated under Disinfectants and Disinfection Byproducts Rule**
- **Regulated as a rolling annual average**
- **Form in distribution systems as result of chlorine reacting with organic material in surface water**
- **Sampled quarterly at four locations in the distribution system**

CONCERNS
IRON AND MANGANESE

Both categorized as secondary contaminants

- Guidelines regarding contaminants that may have aesthetic effects (such as taste, odor, or color) in drinking water.
  - Scituate's manganese concentrations are below the thresholds established by the EPA and MADEP
  - Manganese comes from our wells
  - Iron comes from our pipes

CAUSES

- **Manganese**
  - Manganese is commonly found in groundwater
  - Dissolved manganese precipitates in the water mains and at the point of use
  - Characteristic black color

CAUSES

- **Iron**
  - Comes from corrosion of cast iron pipe (rust)
  - Tuberculation – build up causes rough surface that can accumulate particulate material
  - Characteristic red or yellow color

CAUSES

OLD UNLINED CAST IRON PIPES

- Some pipes in Scituate's system are almost 100 years old

Examples of tuburculated pipe that has been replaced in Scituate

BACKGROUND

HOW DID WE GET HERE?

Old system

- 110 miles of pipes
- There were 22 miles of pre-1935 unlined cast iron pipe
- Major contributor of discolored water

Slow build up of material over time

- Legacy manganese

Deferred maintenance

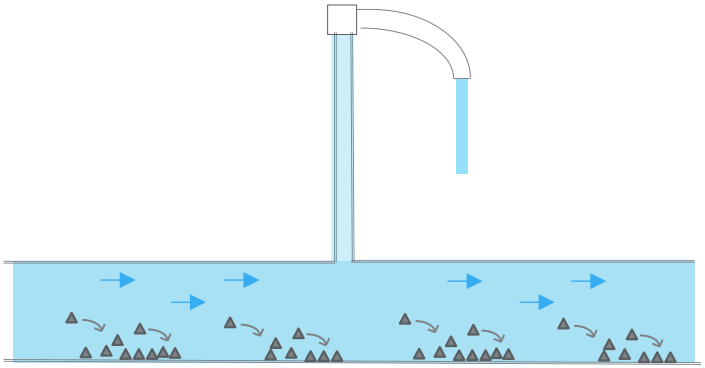
- Before replacement program, town couldn't flush because mains would break
- Board of Selectmen adopted proactive approach five years ago
- Construction is expensive and disruptive

CAUSES

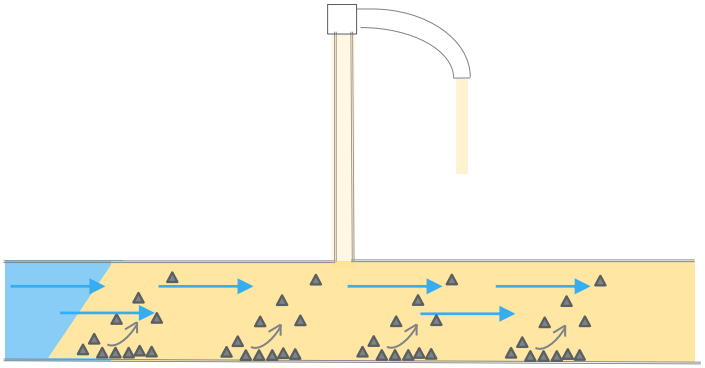
THE PROBLEM HAS TAKEN YEARS TO DEVELOP

Iron and manganese has built up on our pipes over time

- Not a problem during ‘quiet’ periods (low demand)
- Gets stirred up system-wide during ‘busy’ times (high demand)
- Think of it as ‘dust’



Low flow – sediments deposit

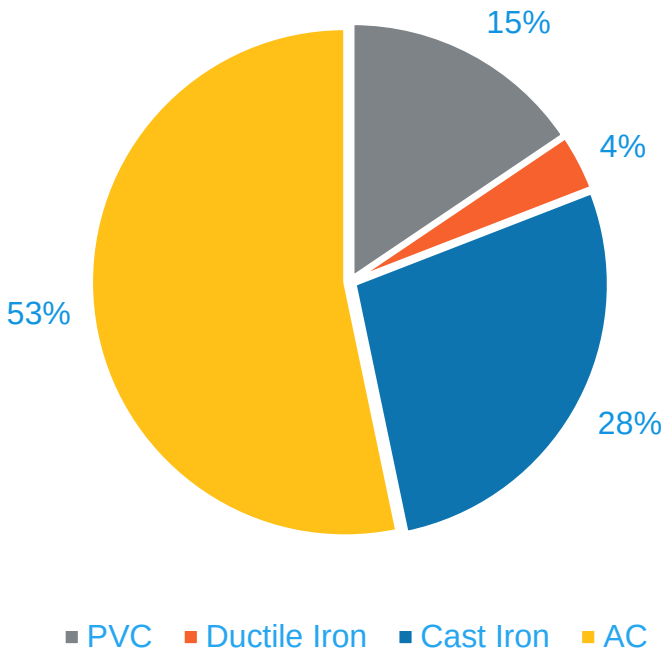


High flow – sediments are mobilized

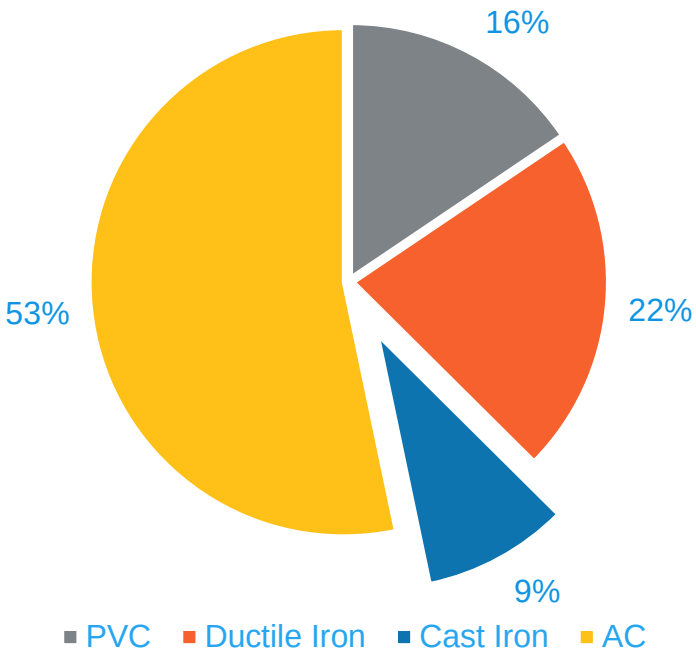
BACKGROUND

WATER SYSTEM BREAKDOWN BY MATERIAL

2011



2018



STRATEGIES TO REDUCE DISCOLORED WATER

1. Remove accumulated material from water mains

- Accumulated material is the immediate cause of complaints
- Flushing
- Ice pigging
- Cleaning & lining
- Replace old cast iron water mains

2. Remove manganese from the sources

- Treatment to remove manganese from source water
- Will not fix the immediate problem but will prevent it from coming back in the future

3. Find new sources

ACTIONS

WHAT WE HAVE ALREADY DONE

1. Removed accumulated material from water mains

- Flushing – first flushing done in February
  - Flushing takes a lot of water and can damage old pipes
- Replace old cast iron water mains

20 MILES OF PIPE REPLACED

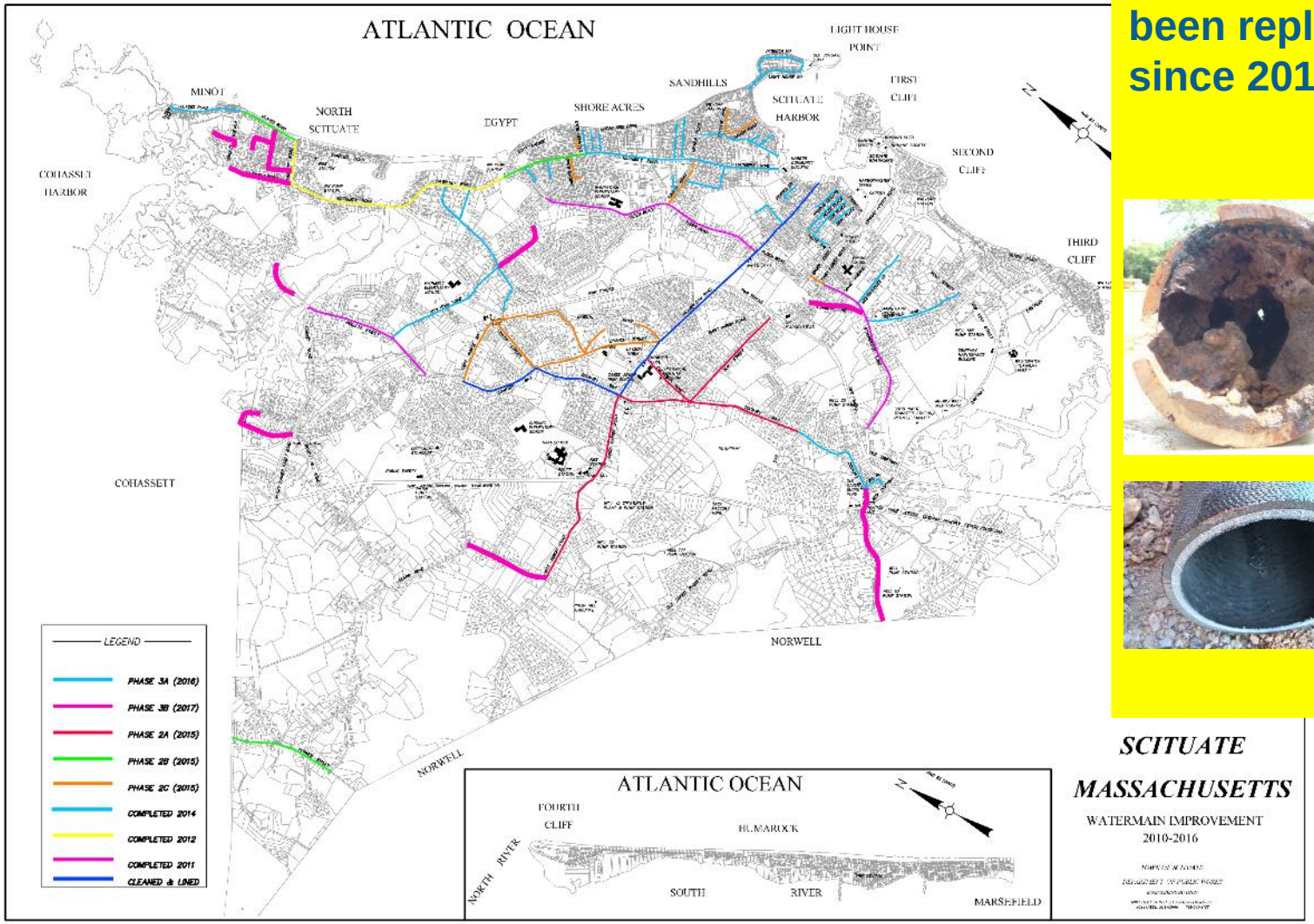
2. Removed manganese from the sources

- Final design of filtration plant for well 17A underway
- Investigate Well 18 treatment options

3. Found new sources

- New satellite well installed at Well 22 to increase production
- Dolan Wells under development
- Reservoir expansion under development

ACTIONS
WHAT WE HAVE ALREADY DONE



$19M of old, rusty pipe has been replaced since 2014

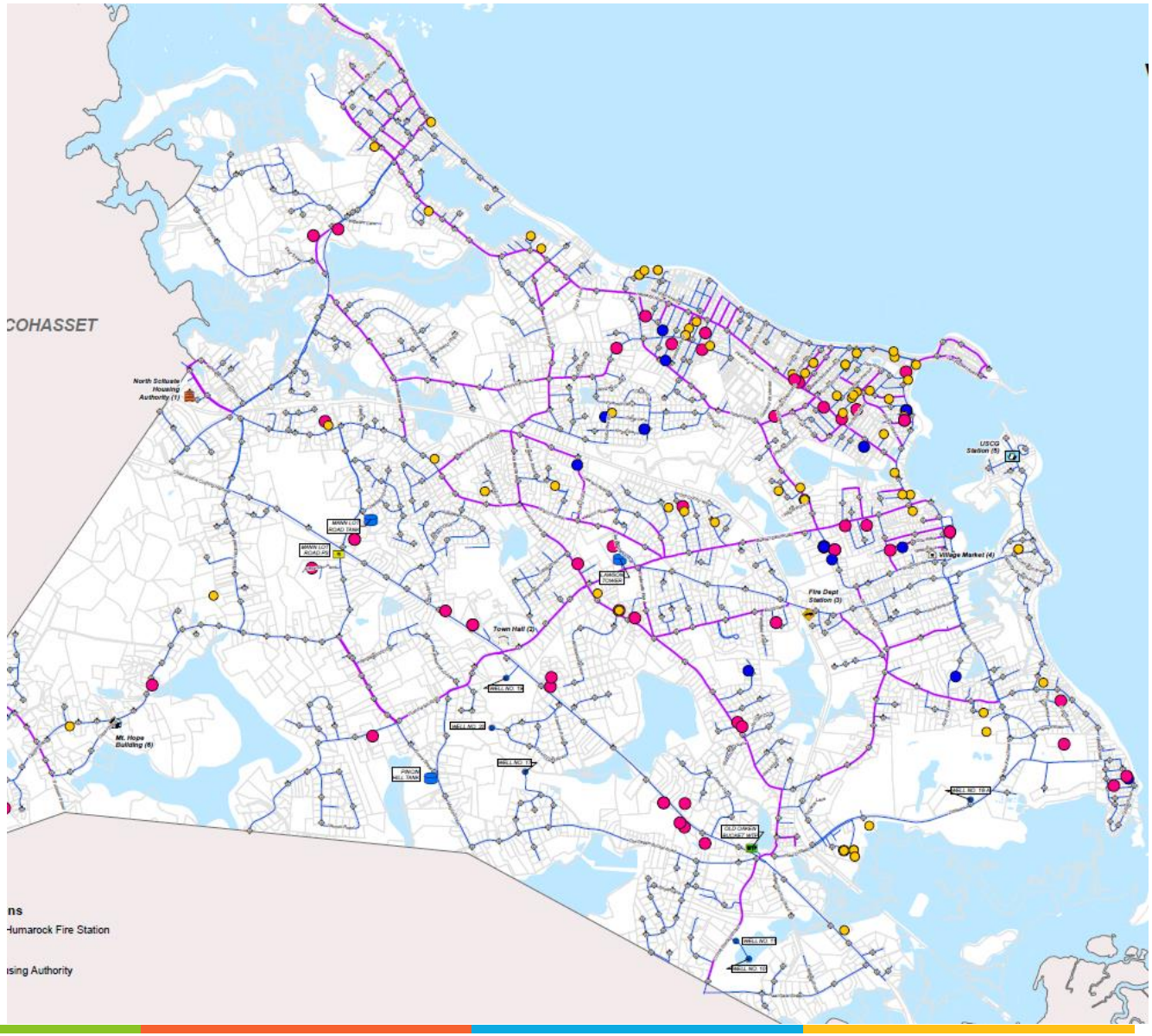
ACTIONS
$21MILLION SPENT ON SYSTEM SINCE 2013

Water Enterprise Capital Projects

2013 to present

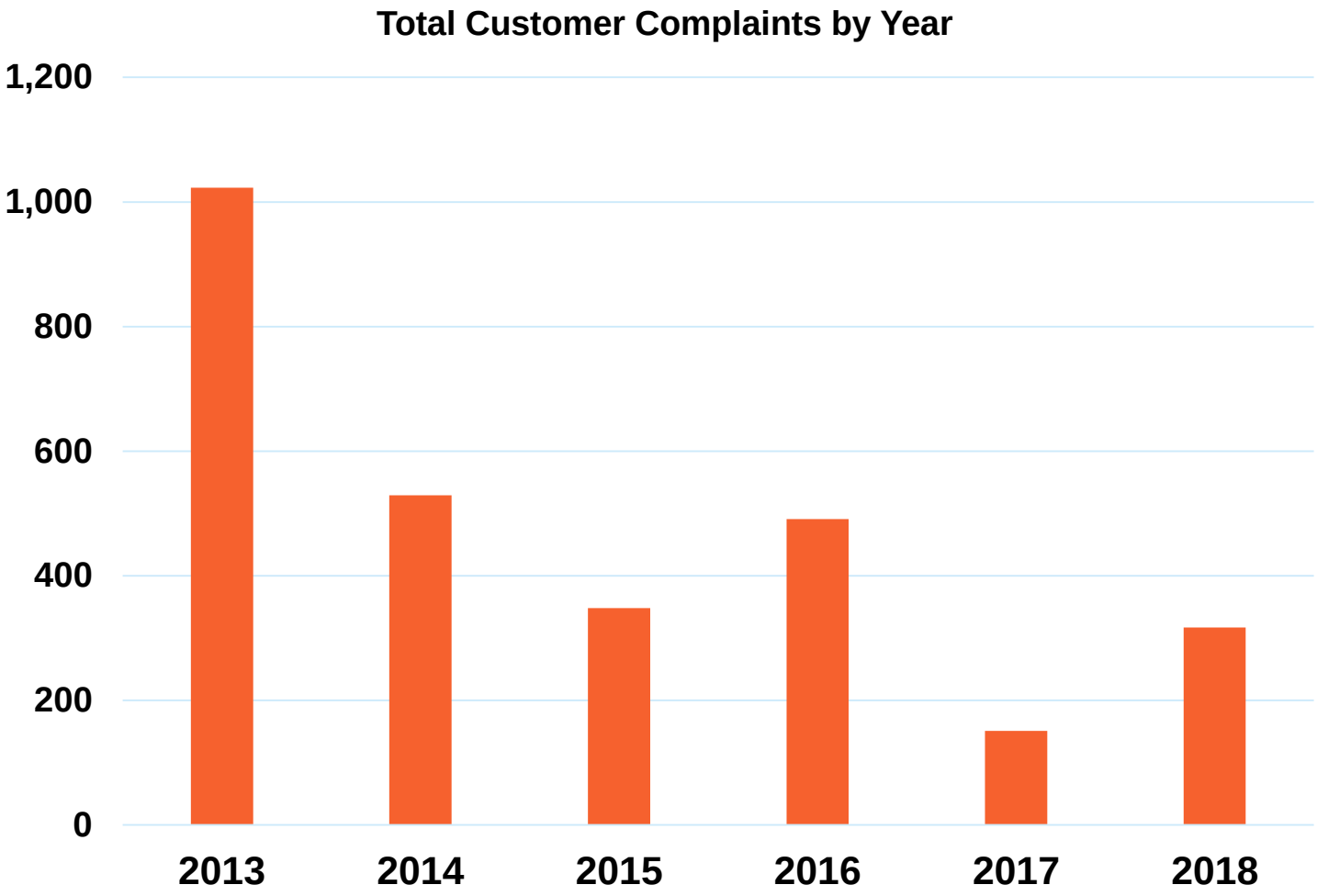
Project	Type	ATM Authorization	Source	Amount	Expended to Date	Comment
Clean & Line Water Mains	Water Quality	ATM 04/2013 Art 3L	Borrowing	$ 400,000	$ 400,000	
Water Pipe Replacement	Water Quality	STM 11/2013 Art 11	Borrowing	$ 22,000,000	$ 19,323,345	
Standpipe Repair & Maintenance	Water Quality	ATM 04/2014 Art 5W	Retained Earnings	$ 75,000	$ 43,778	
Meter Replacement Program	System/Equipment	ATM 04/2014 Art 5X	Retained Earnings	$ 162,000	$ 162,000	
Replace Vehicle #31 2002 Chevy	System/Equipment	ATM 04/2014 Art 5Y	Retained Earnings	$ 29,777	$ 29,777	$223 of original $30,000 transferred to other projects on this list*
Generator at wells	System/Equipment	ATM 04/2014 Art 5Z	Retained Earnings	$ 50,000	$ 50,000	
Meter Replacement Program	System/Equipment	ATM 04/2015 Art 3P	Retained Earnings	$ 85,000	$ 85,000	
Allocation to Water Enterprise Capital Stabilization Fund	Any water enterprise capital project-2/3 TM vote	STM 11/2015 Art 9	Retained Earnings	$ 250,000	$ -	Available for any project-TM vote
Well #19 Environmental Review	Water Quality	ATM 04/2016 Art 4O	Retained Earnings	$ 58,000	$ 7,782	
Emergency Generator at Well #18	System/Equipment	ATM 04/2016 Art 4P	Retained Earnings	$ 85,000	$ -	
Repair Maple St Standpipe	Water Quality	ATM 04/2016 Art 4Q	Borrowing	$ -	$ -	$710,000 transferred to other projects on this list*
Upgrade Well #17A	Water Quality	ATM 04/2016 Art 4R	Transfer from article	$ 100,000	$ 93,432	
Expanding Water Plant Filter Design	Water Quality	ATM 04/2016 Art 4S	Borrowing	$ 80,000	$ -	
SCADA at Wells	System/Equipment	ATM 04/2016 Art 4T	Borrowing	$ 88,000	$ 6,500	
Finish Water Pumps & VFD Drives	Water Quality	ATM 04/2016 Art 4U	Borrowing	$ 135,000	$ 37,045	
Fire Detection/Security WTP	System/Equipment	ATM 04/2016 Art 4V	Transfer from articles* & retained earnings	$ 30,000	$ 25,185	
Replace Truck #35 2007 Chevy	System/Equipment	ATM 04/2016 Art 4W	Retained Earnings	$ 60,000	$ 59,588	
Well #22 Satellite Well	Water Quality	STM 10/2016 Art 1	Retained Earnings	$ 175,000	$ 175,000	
Cohasset Water Pipe Connection	Water Supply	STM 10/2016 Art 1	Retained Earnings	$ 25,000	$ 25,000	
Reservoir Design-Town grant share	Water Supply	STM 10/2016 Art 1	Retained Earnings	$ 39,000	$ 39,000	
Well #22 Satellite Well (construction)	Water Quality	STM 04/2017 Art 1	Retained Earnings	$ 110,000	$ 110,000	
Redevelopment of Public Wells	Water Quality/Supply	ATM 04/2017 Art 3X	Retained Earnings	$ 100,000	$ 99,729	
Dolan Well Field Design & Permitting	Water Supply	ATM 04/2017 Art 3Y	Retained Earnings	$ 200,000	$ -	Contract awarded
Trac Vac System Upgrade	System/Equipment	ATM 04/2017 Art 3Z	Retained Earnings	$ 80,000	$ -	
Reservoir Feed Project	Water Supply	ATM 04/2017 Art 3AA	Retained Earnings	$ 120,000	$ 15,390	
Granulated Activated Carbon Filter Replacement	Water Quality	ATM 04/2017 Art 3BB	Retained Earnings	$ 170,000	$ 125,766	
Replacement of Chevy Pick-up	System/Equipment	ATM 04/2017 Art 3CC	Retained Earnings	$ 40,000	$ 39,681	
Chemical Holding Tank Design	System/Equipment	STM 11/2017 Art 2	Retained Earnings	$ 60,000	$ -	Contract awarded
Valve Replacement-Creelman Tank	System/Equipment	ATM 04/2018 Art 3MM	Transfer from article*	$ 80,000	$ -	
Replacement Chemical Feed Tanks	System/Equipment	ATM 04/2018 Art 3NN	Transfer from article*	$ 450,000	$ -	
Replace Truck #34 2005 Chevy	System/Equipment	ATM 04/2018 Art 3OO	Borrowing	$ 53,000	$ -	Contract awarded
Meter Replacement Program	System/Equipment	ATM 04/2018 Art 3PP	Transfer from article*	$ 175,000	$ 47,125	
Replace Truck #36 2006 Chevy	System/Equipment	ATM 04/2018 Art 3QQ	Borrowing	$ 65,000	$ -	Contract awarded
Upgrade Well #17A (Green Sand Filter)	Water Quality	ATM 04/2018 Art 3RR	Transfer from article* and borrowing	$ 1,259,000	$ -	
Replace Truck #33 2006 Chevy	System/Equipment	ATM 04/2018 Art 3SS	Borrowing	$ 51,000	$ -	Contract awarded
Total Water Enterprise Capital Projects 2013-present				**$ 26,939,777**	**$ 21,000,123**	

CONCERNS
WHY DO WE STILL HAVE DISCOLORED WATER



Tighe&Bond

CONCERNS
WHY DO WE STILL HAVE DISCOLORED WATER



ACTIONS
NEXT STEPS

1. Continue removing accumulated material from water mains

- Water main flushing will continue
- Start ice pigging this fall/winter
  - Relatively new
  - Can effectively treats symptoms
  - Currently developing program

2. Remove manganese from the sources

- Fund construction for Well 17A Filtration Plant
- Fund design for treatment at well 18B (if viable)

Samples from ice pigging operation

FROM MASSACHUSETTS DEP

MassDEP

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

According to a review of MassDEP records, the Scituate Water Department has not had any violations of the Primary Drinking Water Quality Standards between 2013 and the present. Scituate's sampling program has included in excess of 3,500 sampling data points over the past 5 years. Results from these samples are compared to Maximum Contaminant Level (MCLs) and other health-based standards set by the EPA and MassDEP. These enforceable standards are established to ensure public water supplies are safe, further protecting the public against consumption of drinking water contaminants that could present a risk to human health.